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(56) Documents Cited

GB 2125636 A EP 0064105 A1 US 3984712 A

(58) Field of Search

UK CL (Edition Q.) H2A AKD3 AKJ8 AKT5  
INT CL<sup>6</sup> H02K 3/50 3/52 5/22 11/00

(54) Abstract Title

Lead wire arrangement in an electric motor stator

(57) An electric motor stator comprises a pack of armature plates and is provided with an annular element (6) which is fitted to the external ring edge (7) of an electrically insulating cylinder (2). The ring edge (7) is provided with open hollows 10 to permit the passage of the leads of the wires of the stator coil(s) from the interior to the exterior of the ring (7). Walls 16, 18 define wire channels which are closed by element 6. Junction recesses 12 are also present.

Fig.2.

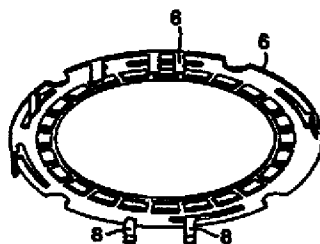
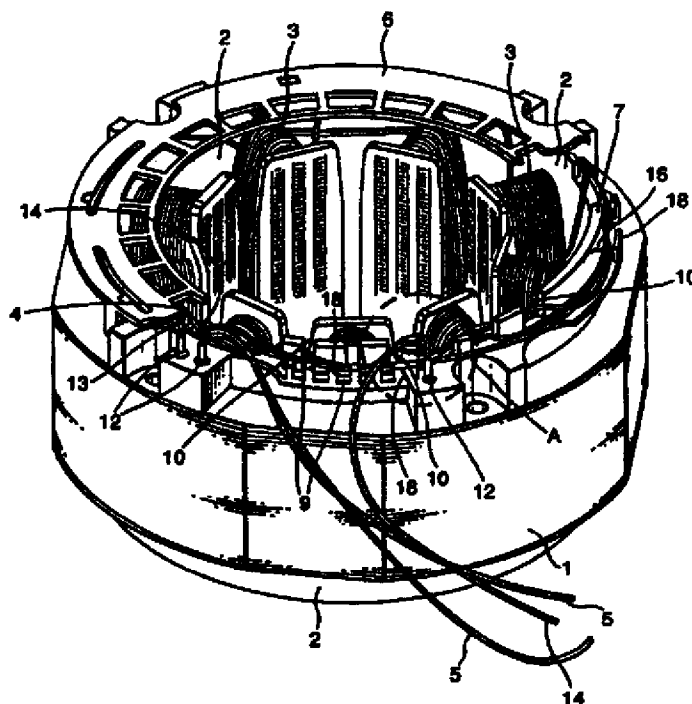


Fig.3.



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Fig.1.

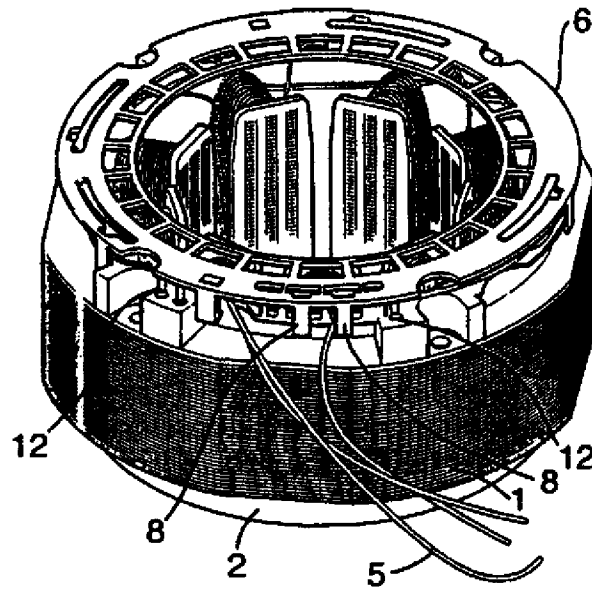


Fig.2.

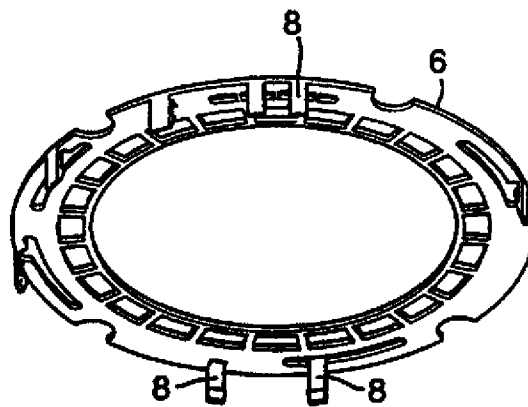
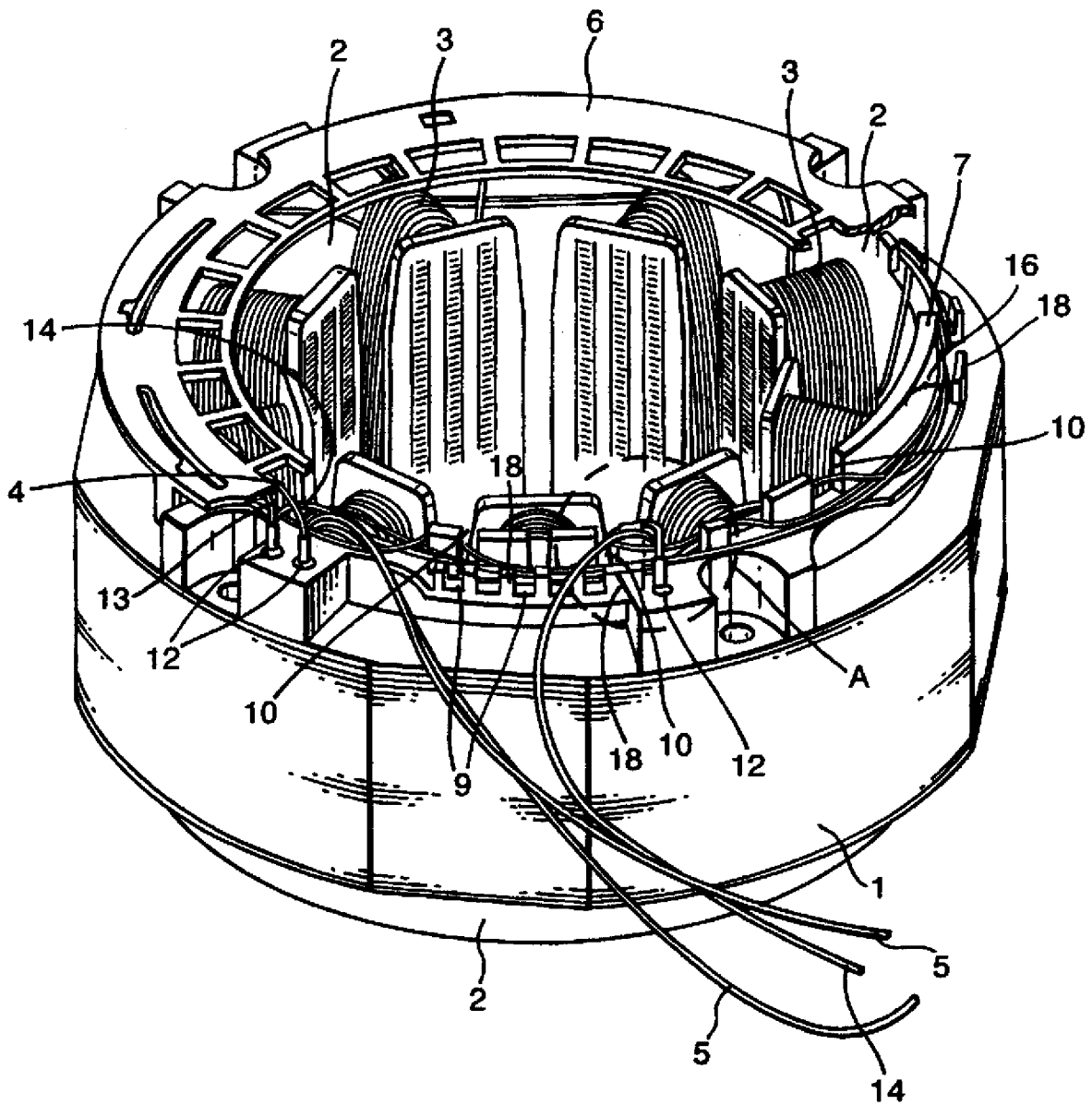


Fig.3.



**ELECTRIC STATOR, IN PARTICULAR FOR SEALED COMPRESSORS**

The present invention concerns a particular form of a stator of an electric motor and an arrangement for anchorage and connection between the electric cables coming from the stator and the respective electric conductors which connect said cables to the external power supply circuit.

Even if hereinafter and for greater ease of description reference is made to a stator used in electric motors of compressors for refrigerating appliances, it will still be appreciated that the present invention is also applied to stators for various uses provided that they fall within the accompanying claims.

Electric compressors for refrigerating appliances are known, the great majority of the motors of which are provided with a stator comprising a stator pack of plates, with three output cables (common, main winding, secondary winding); those output cables are normally connected to the external conductors by means of crimping or soldering between each cable and the respective conductor and subsequent protection for the connection made in that way is effected by using heat-shrinkable tube portions.

The current structure involves fitting in the stator a ring of plastics material which ensures insulation of the windings with respect to earth, which radially contains the associated head portions and on which are performed the fastening operations for blocking the wires issuing from the respective windings.

Although that construction is effective from the functional point of view it does however suffer from some disadvantages which impede and slow down the producibility thereof: such disadvantages are as follows: fastening the wires of the windings to the ring member, which is an expensive manual operation and which interrupts the production cycle; in addition the wires have to pass over the ring member, which contributes to slowing down construction of the stator, and finally the 'flying' crimping as between the wires of the windings and the electric conductors of the

external electric circuit is rather delicate and vulnerable to jerking and breaks.

In addition the operation involving crimping, affording protection with a tube portion and accommodating the connection in a recess to be found within the windings is a completely manual one and therefore involves a heavy burden and a lower level of quality having regard to the ease with which the electric cables can break; in addition there is no possibility of effecting automated intermediate checks in regard to the continuity of the electric contacts produced, with a further decline in the quality of production and a consequential increase in the level of rejects in the end-of-production tests.

Particular devices referred to as 'block portions' are also known, which are fitted to a head portion of the stator pack and which bring together the various electrical connections coming from the windings of the stator and from the exterior; however that construction, even if it is an improvement on the current state of the art, cannot be applied to stators which do not have sufficient space for fitting the block portions, and in any case they do not resolve the problem of the manual fastenings of the windings.

It would therefore be desirable, and this is the aim of the present invention, to provide a stator which can be produced in a highly automated and standardised fashion, which permits a high level of intrinsic quality in terms of production procedures combined with easy and advanced suitability to being electrically checked in terms of continuity and which is as standardised as possible in regard to the components involved, while being economical and easy to assemble with the use of materials and procedures which are permitted by the current state of the art.

According to the present invention there is provided an electric stator comprising a pack of plates, an electrically insulating cylinder disposed internally of said pack of plates, a plurality of electric windings inserted in the cylindrical chamber which is internal to said pack of plates, a plurality of electric wires terminating said electric windings and the free ends of which are connected to

respective cables connected to the external circuit, an external insulating edge of ring-shaped configuration of said insulating cylinder emerging at a level which is just barely higher than the level of the windings projecting from the same side of the pack of plates, wherein there is disposed an annular element capable of being removably engaged with said ring-shaped edge.

The invention will be further described by way of non-limitative example with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a stator provided with the arrangement according to the invention;

Figure 2 is a perspective view of the supplementary annular element according to the invention, seen alone; and

Figure 3 is a view similar to Figure 1 but with the device of Figure 2 partially broken away in order better to show the details provided on the stator according to the invention.

The invention relates to a stator which is formed by a pack of plates 1, a cylinder 2 of insulating material disposed internally in known manner of said pack of plates, and a plurality of windings 3 provided in a manner which is also known in the interior of the stator cylinder.

Extending from the windings are electric wires 4 which are joined by various procedures such as for example crimping to respective cables 5 which are drawn in highlighted manner, connecting the windings to the external electric circuit.

The invention substantially involves eliminating the fixing of the wires to the edge of said cylinder, and providing and fitting an annular element 6 to the external edge or ring 7 of the insulating cylinder 2.

The annular element 6 is provided with a plurality of hook or catch elements 8 which are intended to come into latching engagement with a corresponding plurality of openings 9 provided in the ring 7.

In addition the ring 7 which can be seen in Figure 3 is provided at its external edge with a plurality of open

hollows 10 of typically V-shape or U-shape, which are suitable for wires 4 from the windings to pass therethrough.

In that way it is possible for those wires to be passed to the exterior of the stator and latching engagement of the annular element 6 to the ring 7 provides for stably locking the wires in the desired position without the need for fastening.

A useful improvement in the invention involves disposing on the outside of the ring 7, and integrally therewith, a plurality of recesses 12 of dimensions such as each to be capable of accommodating the junction portion between an end 13 of a wire coming from a winding and the corresponding cable 14 which connects that winding to the external electric circuit.

In that way each junction 14 is fitted into the respective recess accommodating it, thereby resulting in the favourable situation of being stabilised in position and in particular protected from any jerks which could interrupt that junction, having regard to the difficulty of inadvertently extracting the junction from the respective recess accommodating it, and the practical impossibility of interrupting the junction when it is still within the respective recess.

That advantage is further enhanced if the recesses are disposed in the immediate vicinity of respective hollows from which pass the wires which go into the same recesses, such that the length of wire between said hollow and the associated recess is at a minimum, thus further reducing the risk of casual extraction of the junction portion, as shown by way of example in Figure 3 within the dotted-line closed perimeter identified by A.

A further improvement is achieved if the ring 7 is provided on the outside thereof with a conduit or channel 16 which can be produced in various ways by means of suitable shaping, in such a way that the wires coming from the windings and after having passed through respective hollows can be contained therein, being properly guided towards the respective recesses for accommodating same and thus being

protected, and thus affording a reduced risk of being accidentally jerked out.

5            Preferably the conduit or channel 16 is defined on one side by the ring 7 and on the other side by a plurality of raised portions 18 which are connected to the cylinder 2 and which are thus fixed with respect to the ring 7, preferably being integrally moulded therewith.

10           The arrangement which has been described above and shown with reference to the accompanying drawings has been set forth purely by way of example without thereby departing from the present invention.

## CLAIMS

1. An electric stator comprising a pack of plates, an electrically insulating cylinder disposed internally of said pack of plates, a plurality of electric windings inserted in the cylindrical chamber which is internal to said pack of plates, a plurality of electric wires terminating said electric windings and the free ends of which are connected to respective cables connected to the external circuit, an external insulating edge of ring-shaped configuration of said insulating cylinder emerging at a level which is just barely higher than the level of the windings projecting from the same side of the pack of plates, wherein there is disposed an annular element capable of being removably engaged with said ring-shaped edge.

2. A stator according to claim 1, wherein said ring is provided with a plurality of open hollows for permitting the passage of the winding wires from the internal zone to the external zone of said ring-shaped edge.

3. A stator according to claim 2, wherein disposed on the outside of said ring-shaped edge is a plurality of recesses for accommodating respective ends of said winding wires.

4. A stator according to claim 3, wherein in said recesses said ends of said winding wires are electrically connected to respective cables capable of connecting the respective windings to the electric circuit which is external to the stator.

5. A stator according to any one of the preceding claims, wherein said ring-shaped edge is provided on its external part with an open channel capable of accommodating said wires coming from said windings.

6. A stator according to claim 5, wherein said channel is defined on one side by said ring and on the other side by

a plurality of raised portions connected to the cylinder preferably being integrally moulded with the ring.

7.           A stator according to any one of claims 3 to 6,  
5   wherein said recesses are disposed, even in part, in the immediate vicinity of said hollows,

8.           A stator according to any one of claims 1 to 7,  
wherein  
10           said annular element closes said hollows on the ring such that the associated wires are obliged to remain fitted in the respective hollows; and  
              said annular element is engageable with latching elements with respect to said ring.

15           9.           A stator substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

20   10.           An electric motor comprising an armature and a stator, the stator being in accordance with any one of the preceding claims.



**Application No:** GB 9825288.5  
**Claims searched:** 1-10

**Examiner:** John Cockitt  
**Date of search:** 18 May 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): H2A [AKT5, AKJ8, AKD3]

Int Cl (Ed.6): H02K [3/50, 3/52, 5/22, 11/00]

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB2125636A SEELEY	
A	EP0064105A1 AMP	
A	US3984712A INDUSTRIA	

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.

